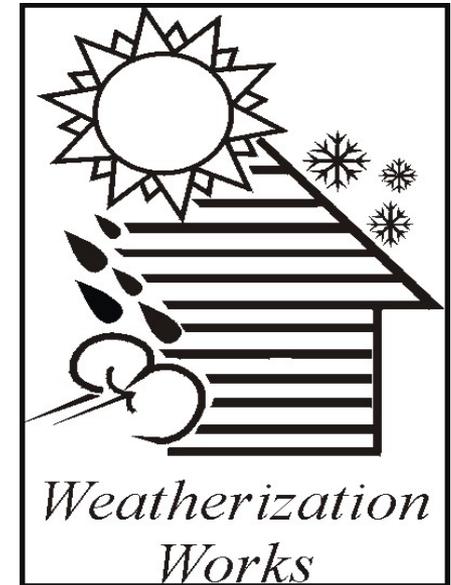


Low-Income Energy Burdens in the Southeast: Solutions through Community, Business and Policy Engagement

Presented by:

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Georgia Institute of Technology
https://cepl.gatech.edu/projects/low_income

Southeast Climate and Energy Network
May 30, 2018
Atlanta, Georgia



Outline

- ▶ Research Team, Collaborators, and Objectives
- ▶ Key Findings: Georgia and Atlanta
- ▶ Conclusions: Low-Income Households, Utilities, Policy-makers
- ▶ Next Steps

Research Team & Collaborators

Team Member	Organization
Dr. Marilyn Brown (CO-PI)	School of Public Policy Ivan Allen College of Liberal Arts Brook Byers Institute for Sustainable Systems Georgia Institute of Technology
Michael Oxman (CO-PI)	Ray C. Anderson Center for Sustainable Business at Scheller College of Business Georgia Institute of Technology
Dr. Beril Toktay (CO-PI)	Ray C. Anderson Center for Sustainable Business at Scheller College of Business Georgia Institute of Technology
Majid Ahmadi	School of Public Policy (Climate & Energy Policy Laboratory) Georgia Institute of Technology
Naveed Ahmad	Scheller College of Business Georgia Institute of Technology
Yasaman Mohammad Shahi	H. Milton Stewart School of Industrial & Systems Engineering Georgia Institute of Technology
Suzanne Burnes Naajia Ahmed	Collective Wisdom Group
Sabrina Cowden Luke Gebhard Erik Froyd	Milepost Consulting

Collaboration Highlights:

- ▶ *Business, Public Policy, Engineering Expertise*
- ▶ *Faculty & Student Collaboration*
- ▶ *Enhanced stakeholder engagement via knowledgeable contractors*

Study Overview and Objectives

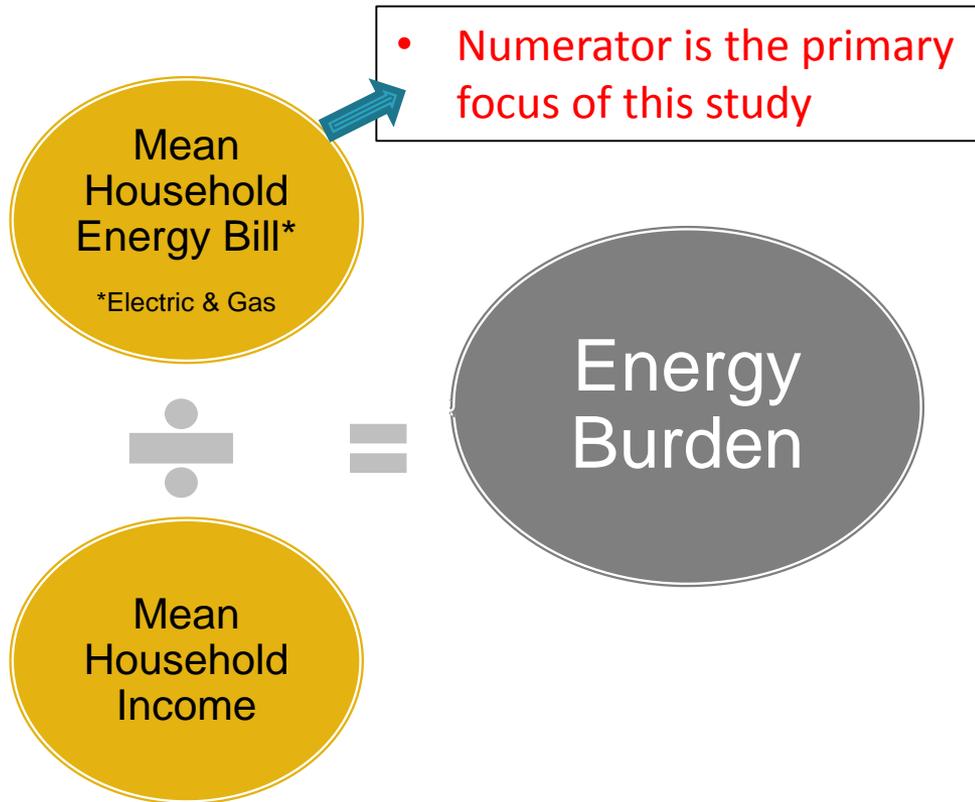
1. What are the primary drivers & baseline attributes of the high energy burden in Atlanta?

2. What are the most potentially promising program attributes for alleviating energy burden circumstances in the Atlanta area?

3. What are the business case & policy drivers that may offer greater scale for identified approaches & solutions?

Study Overview and Definitions

▶ What is an Energy Burden?



- There is no widely accepted value or threshold that establishes whether a household faces a high or unaffordable energy burden. (ACEEE, 2017)
- However, the U.S. Department of Health and Human Services classifies an energy burden of above 6% as “unaffordable” (Colton, What is the Home Affordability Gap, 2017) 5

Impetus for Study

Energy burdens in the 10 most burdened U.S. cities.

	All households	Low-income households*	Low-income multifamily households	African-American households	Latino households	Renting households
1	Memphis (6.2%)	Memphis (13.2%)	Memphis (10.9%)	Memphis (9.7%)	Memphis (8.3%)	Memphis (8.6%)
2	Birmingham (5.3%)	Birmingham (10.9%)	Birmingham (8.7%)	Pittsburgh (8.3%)	Providence (7.3%)	Birmingham (7.3%)
3	New Orleans (5.3%)	Atlanta (10.2%)	Atlanta (8.3%)	New Orleans (8.1%)	Philadelphia (7.3%)	Atlanta (6.8%)
4	Atlanta (5.0%)	New Orleans (9.8%)	Providence (7.1%)	Kansas City (7.9%)	Kansas City (6.6%)	New Orleans (6.3%)
5	Providence (4.7%)	Providence (9.5%)	Pittsburgh (7.1%)	Birmingham (7.7%)	Atlanta (6.6%)	Providence (6.2%)
6	Pittsburgh (4.5%)	Pittsburgh (9.4%)	New Orleans (6.9%)	Milwaukee (7.4%)	Birmingham (6.6%)	Kansas City (6.1%)
7	Kansas City (4.5%)	Dallas (8.8%)	Columbus (6.5%)	St. Louis (7.4%)	Phoenix (6.0%)	Pittsburgh (6.0%)
8	Fort Worth (4.4%)	Philadelphia (8.8%)	Dallas (6.5%)	Cleveland (7.0%)	Dallas (6.0%)	Cincinnati (6.0%)
9	Cincinnati (4.3%)	Kansas City (8.5%)	Indianapolis (6.5%)	Cincinnati (6.9%)	Fort Worth (5.7%)	St. Louis (5.9%)
10	Dallas (4.3%)	Cleveland (8.5%)	Kansas City (6.3%)	Atlanta (6.6%)	Detroit (5.7%)	Cleveland (5.5%)

* Low-income includes both single- and multifamily households.

Source: ACEEE, Lifting the High Energy Cost Burden in America's Largest Cities: How Energy Efficiency Can Improve Low Income and Underserved Communities

**DRIVERS & ATTRIBUTES OF
ENERGY BURDEN:
GEORGIA**

Many FACTORS CONTRIBUTE TO HIGH ENERGY BURDENS (VIA BOTH NUMERATOR & DENOMINATOR) IN GEORGIA

Numerator

- 35th in EE policies
- 2nd highest residential natural gas prices in country
- 5th highest average temperature in country
- Among highest in air conditioning and space heating use

Denominator

- 41st in per capita income
- ~45% of Southern Co. customers at or below \$40K income (Southern Co.)
- The Southeast lags behind the rest of the nation in terms of % of residents living in poverty

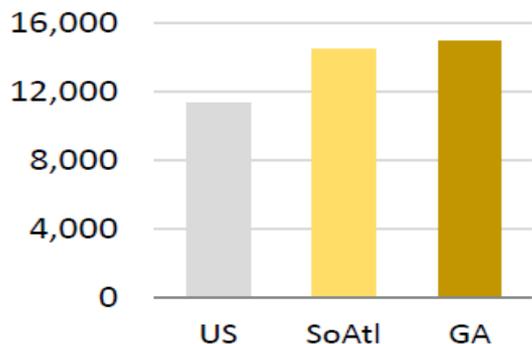


Source: EIA, [Household Energy Use in Georgia](#)

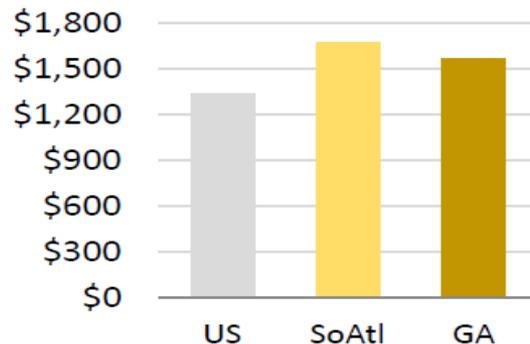
Georgia's Electricity Consumption and Home Size Lead to High Energy Burdens

ELECTRICITY ONLY *average per household*

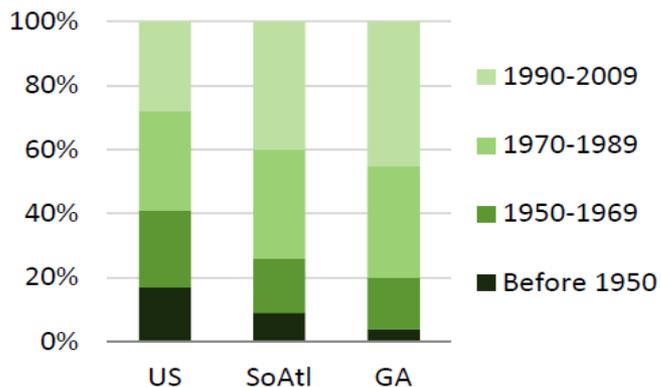
Site Consumption
kilowatthours



Expenditures
dollars



YEAR OF CONSTRUCTION



AVERAGE SQUARE FOOTAGE

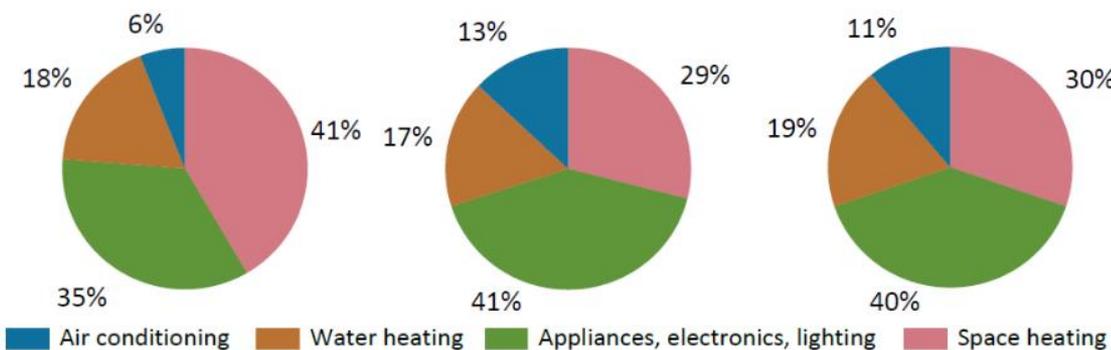
US	1,971
SoAtl	1,944
GA	2,304

- Household electricity consumption in Georgia is among the highest in the country, but similar to other states in the South
- While 45% of homes in Georgia were built since 1990 (typically associated with lower energy consumption), Georgia's homes are larger than the U.S. average, likely offsetting some of the efficiencies associated with living in newer homes

Note: SoAtl is South Atlantic Region, which includes Delaware, DC, Florida, Georgia, Maryland, North Carolina, South Carolina, Virginia, West Virginia

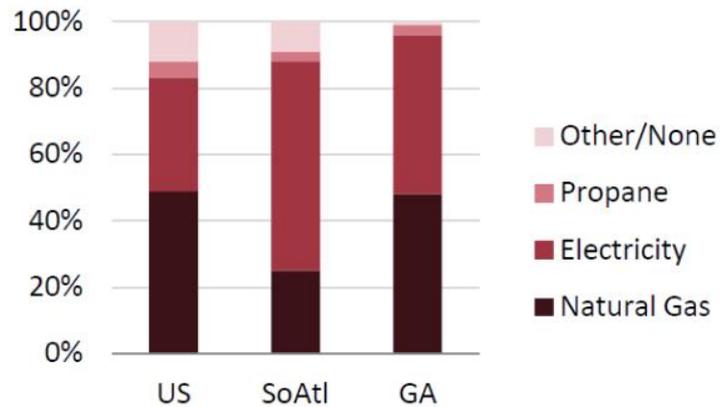
Source: EIA, [Household Energy Use in Georgia](#)

Georgia's High Cooling Needs & Inefficient HVAC Systems also Contribute to High Energy Burdens



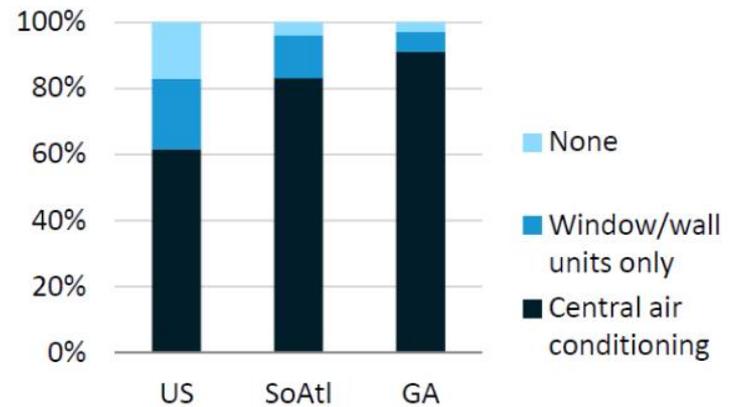
Georgia is one of the few states where at least 30% of household energy consumption is used for space heating and at least 10% of the energy consumed in homes is used for air conditioning.

MAIN HEATING FUEL USED



Natural gas (48%) and electricity (48%) are the dominant main heating fuel choices in Georgia homes.

COOLING EQUIPMENT USED

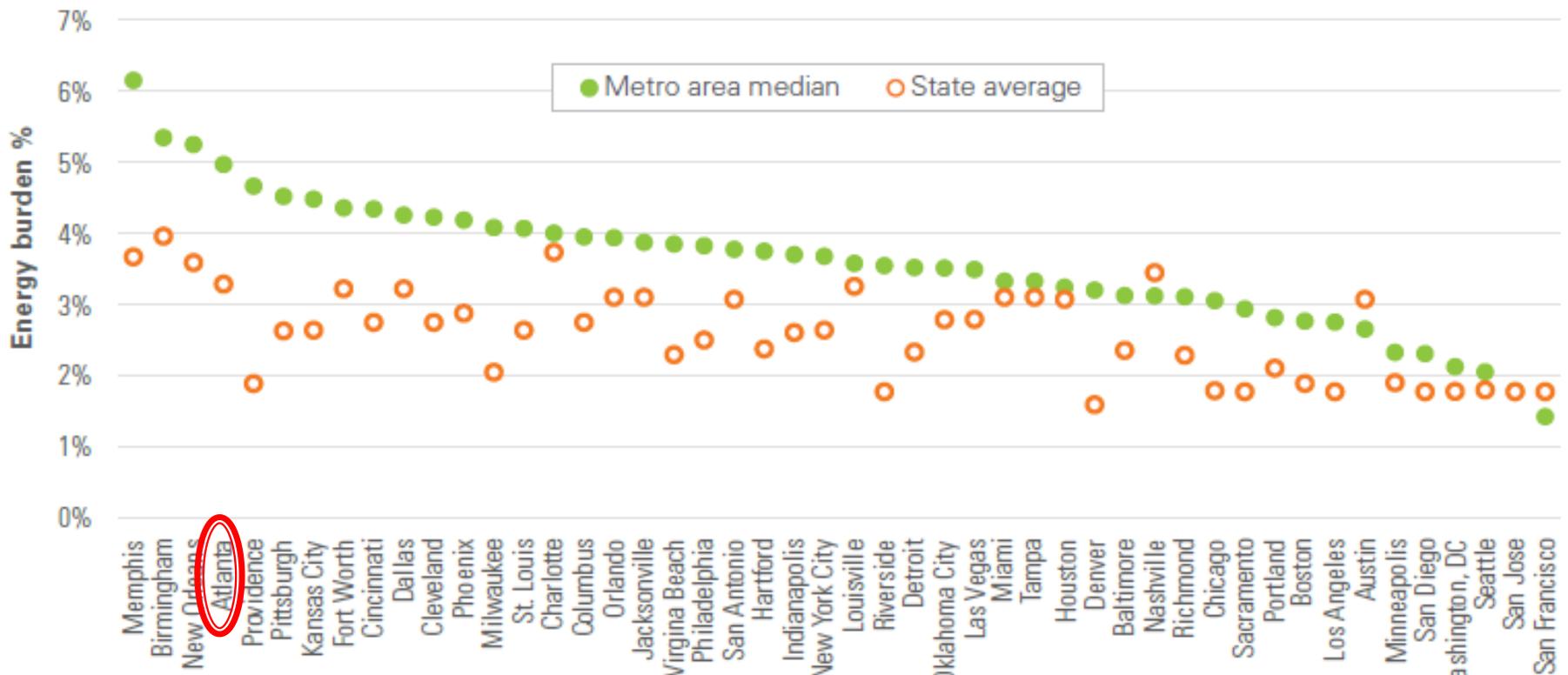


Over 90% of Georgia residents use a central air conditioning system to cool their homes.

Source: EIA, [Household Energy Use in Georgia](#)

**DRIVERS & ATTRIBUTES OF
ENERGY BURDEN:
ATLANTA**

Median Energy Burden in Atlanta > Average Energy Burden in Georgia



Source: ACEEE, [Lifting the High Energy Cost Burden in America's Largest Cities: How Energy Efficiency Can Improve Low Income and Underserved Communities](#)

Low-income Households Under Subscribe in EE Programs

Causes include:

- 1) High up-front costs of EE investments
 - 2) Split incentives between owners and renters
 - 3) Lack of access to information about efficiency programs
 - 4) Aging housing stock
- ▶ Most utilities offer electric efficiency programs for low-income households, such as Georgia Power's Energy Assessment & Solutions Program (EASP).
 - ▶ Few utilities offer natural gas efficiency programs.*

Interviews suggest that natural gas account hookup fees were prohibitive for some low-income Atlantans, posing a barrier to access of this fuel source for heating

*ACEEE, [Making a Difference: Strategies for Successful Low-Income Energy Efficiency Programs, Building Better Energy Efficiency Programs for Low-Income Households](#)

“Common” Drivers Reveal Insights for Atlanta

Low-income households:

- Are seldom targeted for appliance and replacement incentives
- Purchase far fewer ENERGY STAR appliances
- Are less likely to have programmable thermostats
- Are more likely to leave heating temperature same when residents are away from home
- Are more likely to have older appliances (obtained secondhand)
- Are more likely to heat their homes primarily with electricity
- Often use portable electric heaters as their primary heating equipment

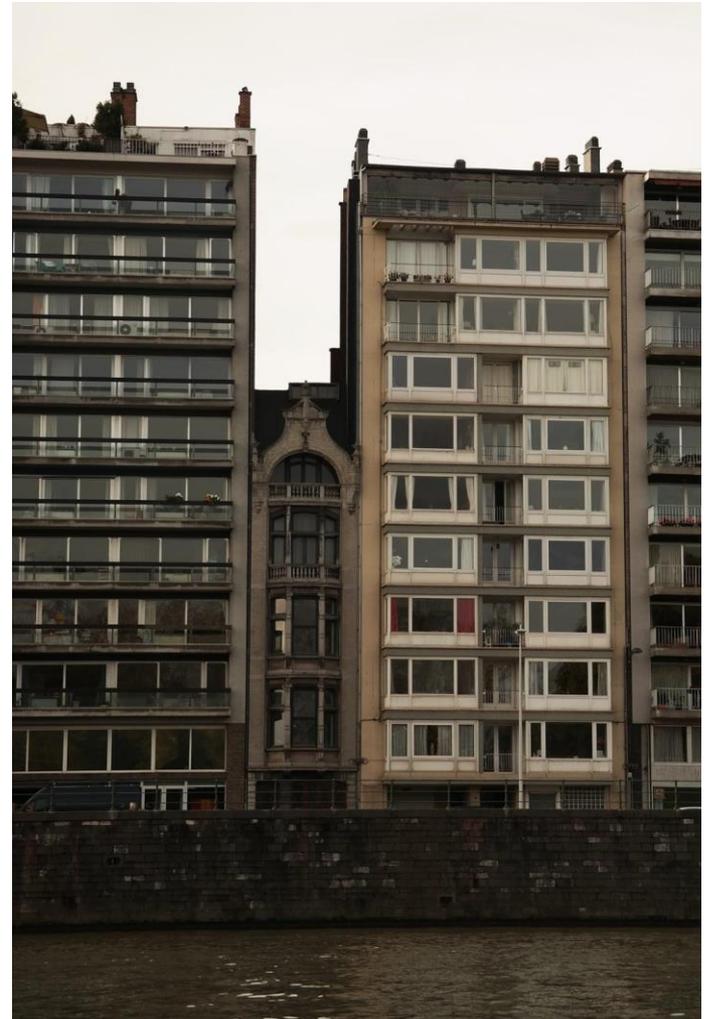
Our interviews & research corroborate many of these findings and notably point to evidence of low-income Atlantans relying on kitchen stoves & kerosene heaters for home heating



Challenges of Atlanta's MF and Renting Households that Contribute to Energy Burdens

- 25% of total housing stock in Atlanta MSA is multifamily
- Most affordable, low-rent apartments are privately owned and do not receive any federal or state rental assistance.
- Average income for multifamily households is lower than single-family households.

Source: ACEEE, [Multiple Benefits of Multifamily Energy Efficiency for Cost-Effectiveness Screening](#)

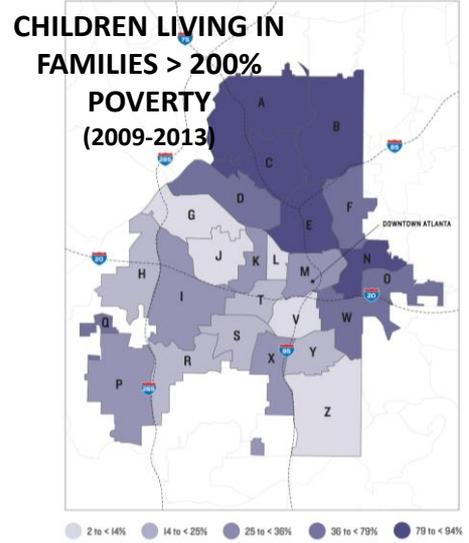
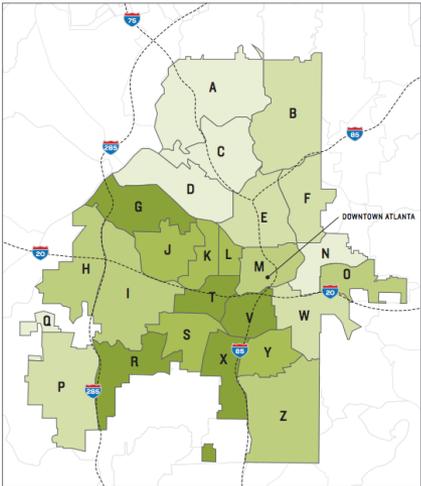
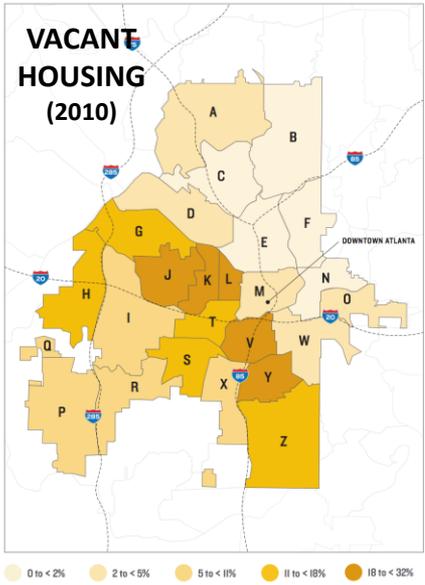
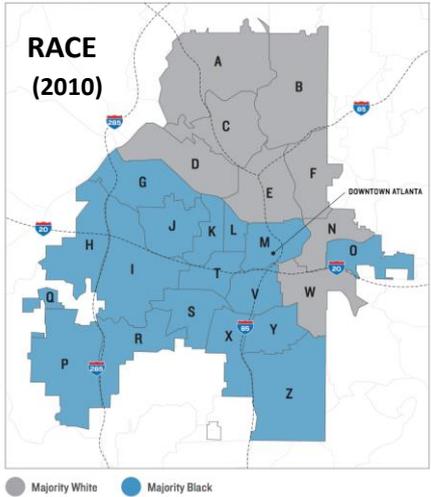
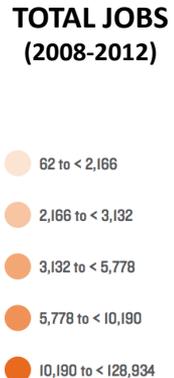
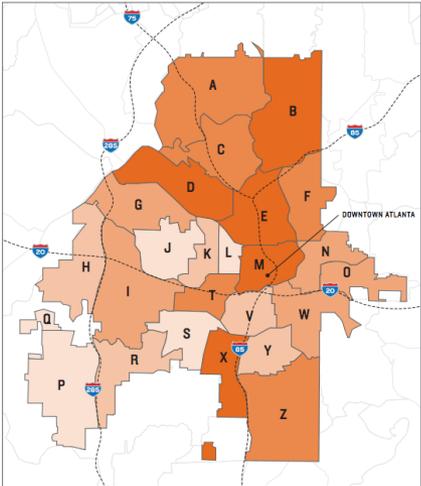
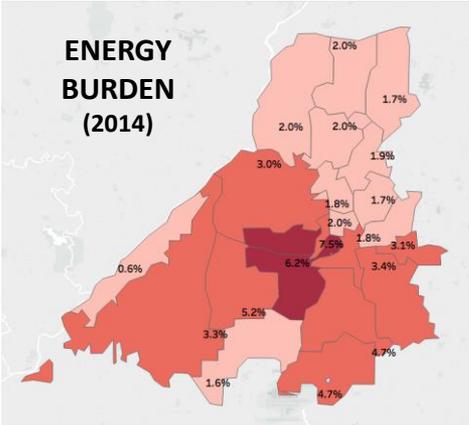


Living in Energy Inefficient Housing Contributes to an Enduring Cycle of Poverty

- Low-income families unable to pay their high energy bills become vulnerable to utility shutoffs, which can lead to homelessness.
- Cash-strapped families and individuals become prey to predatory payday loans as their only option to pay utility bills and avoid shutoffs. These small, short-term loans come with high interest rates that make repayment difficult.
- Even many who are able to pay bills are unbanked and must rely on high-fee check cashing operators to cash their paycheck, then charge an additional fee to pay utilities.
- Absentee landlords under invest in home repairs.

“The unemployment rate for African Americans in Atlanta (22 percent) is nearly twice the city’s overall 13 percent, more than three times higher than the rate for their white counterparts (6 percent) and more than twice the rate for Latinos (9 percent).”*

High Energy Burdens Found in Atlanta Communities With Many Other Challenges

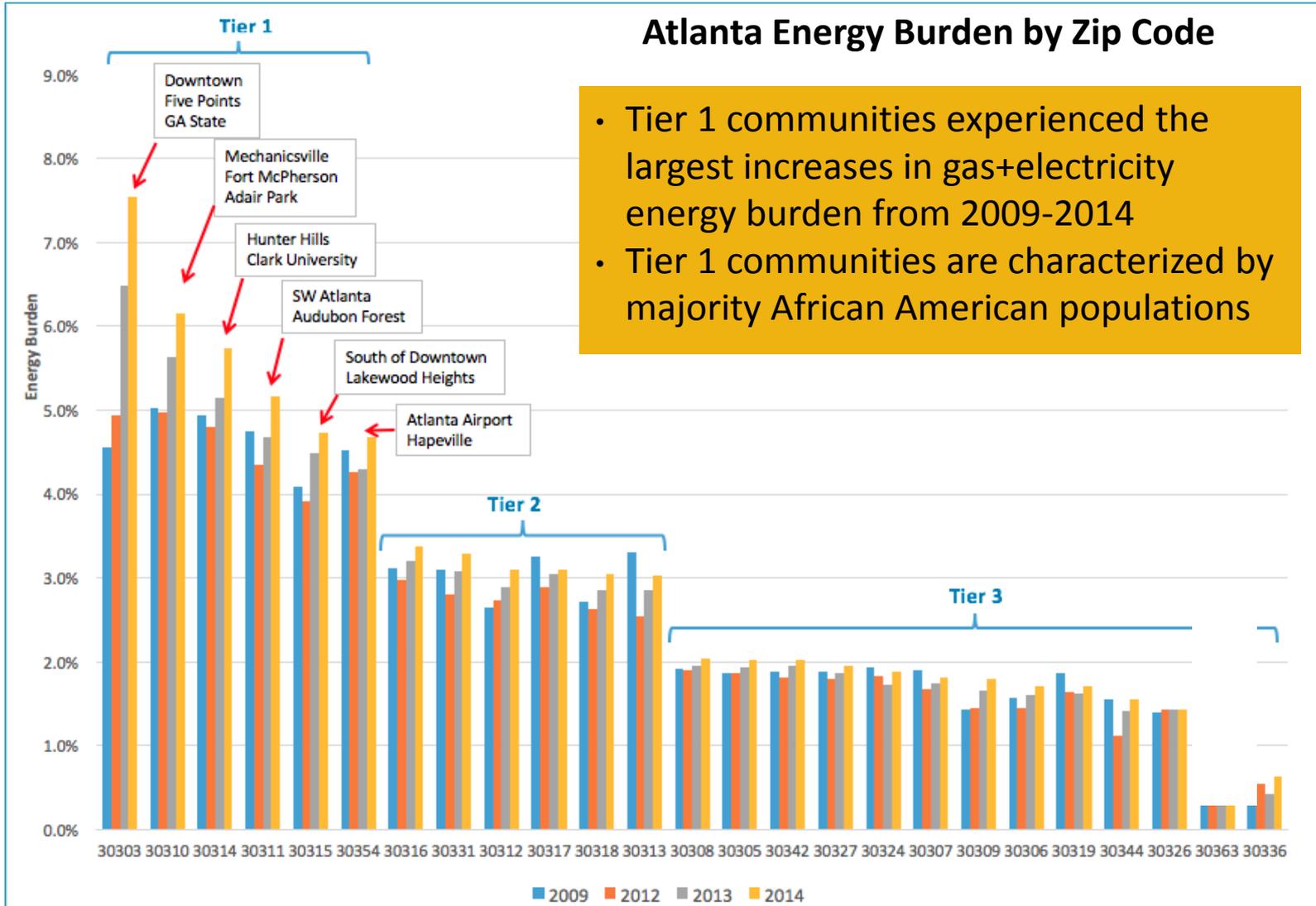


Sources: Annie E. Casey Fdtn., [Changing the Odds](#), [ARC Neighborhood Nexus](#)

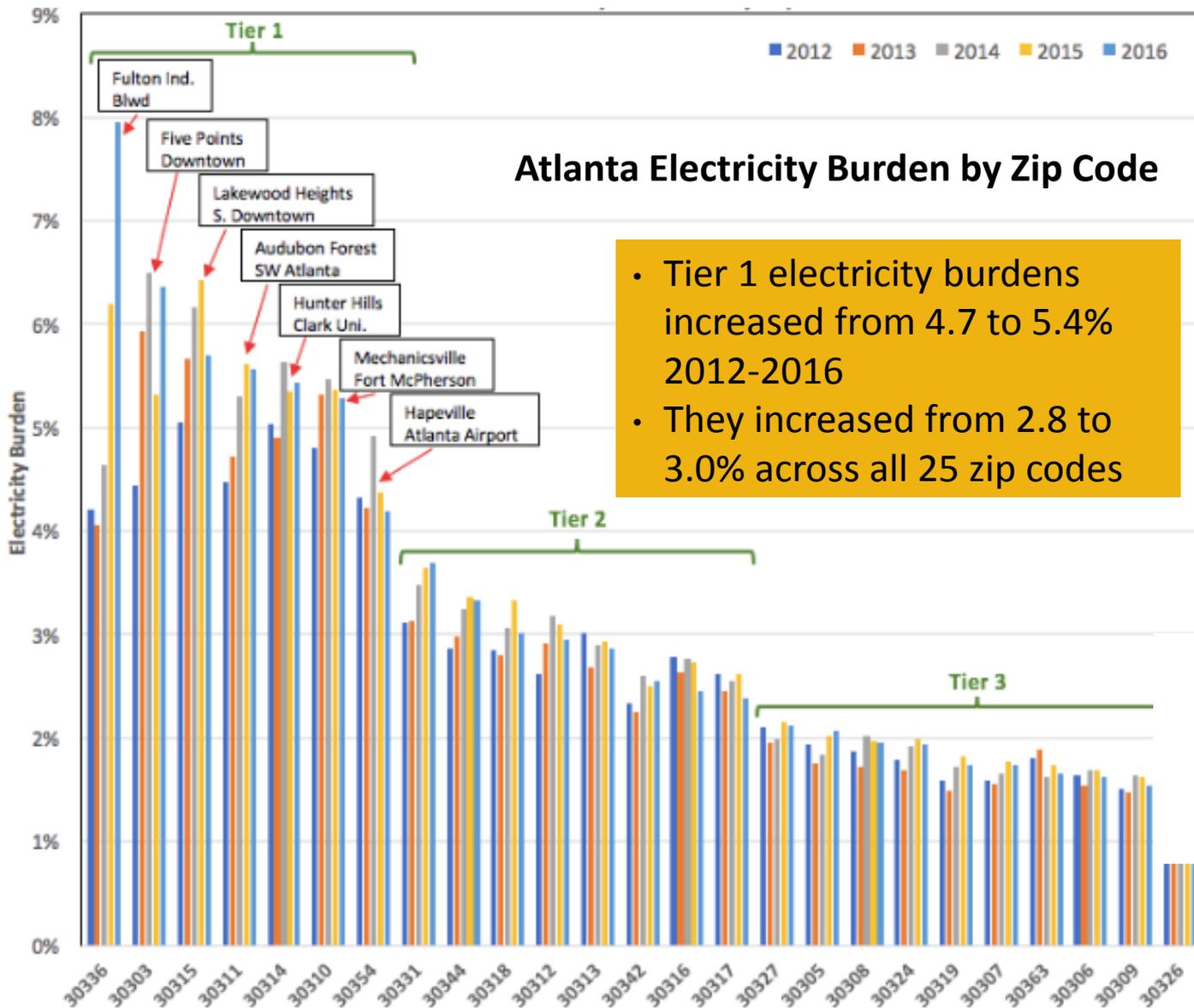
Key Findings of Statistical Analysis

- While Georgia has relatively low electricity rates, other energy burden factors are prevalent (large home size, high poverty rates, hot/cool climate, lower relative spending in US SE on EE)
- Regression analysis found the following predictors Energy Burden:
 - Low vehicle ownership
 - High food stamp receipts
 - Low housing values
 - High %s of single-family housing
 - More transiency
 - Older homes (particularly built before 2000)
 - High levels of heating and cooling degree days

Energy Burdens in Atlanta are Growing (Electricity + Natural Gas)

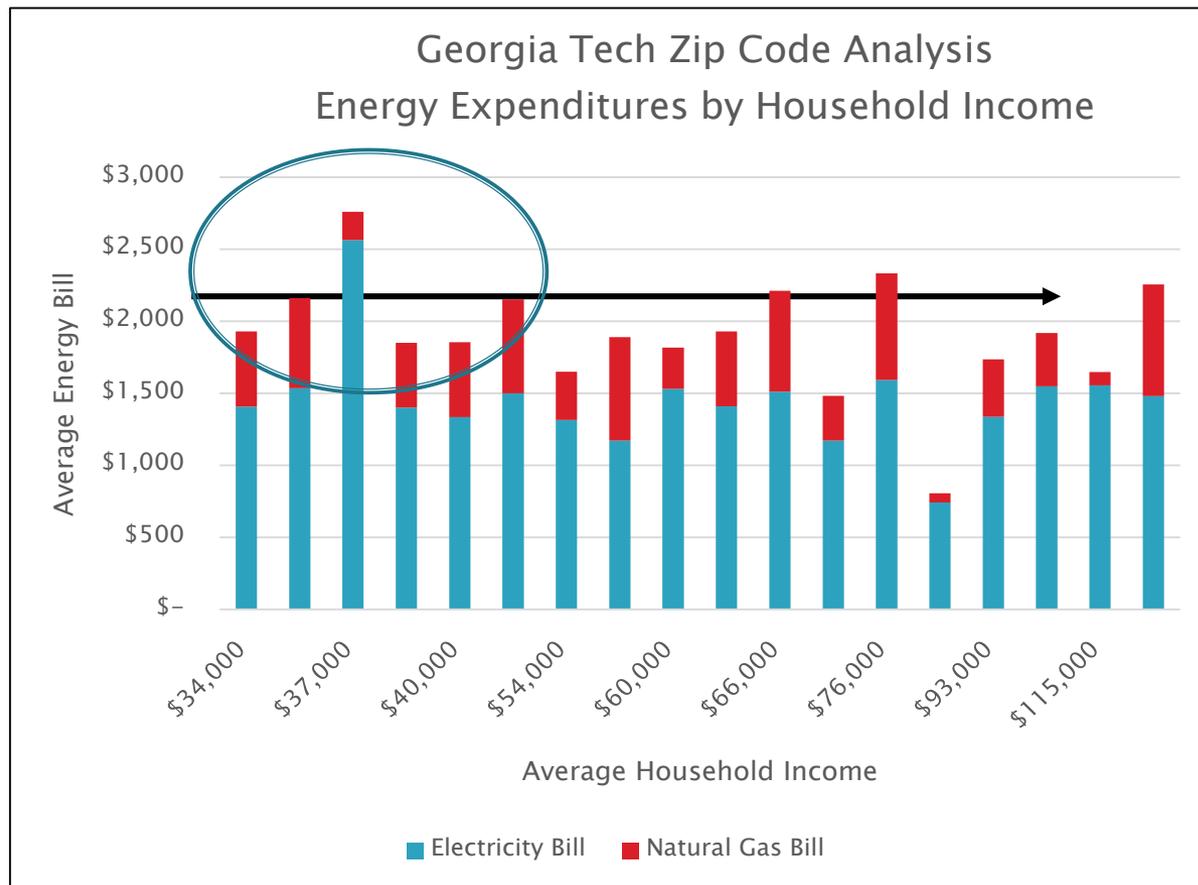


Electricity Burdens in Low-Income Zip Codes of Atlanta are Growing

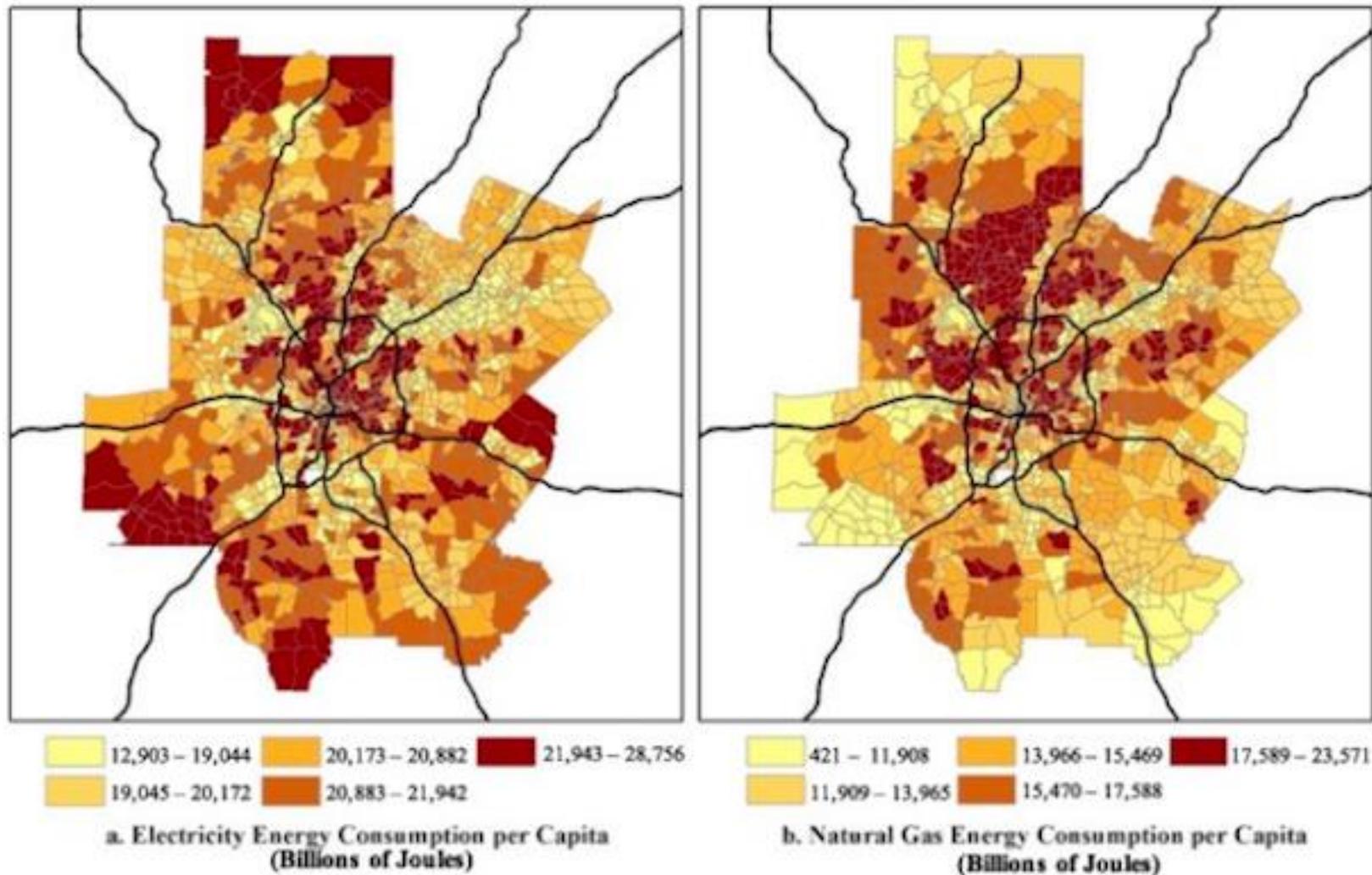


Atlanta's highest energy burdens are concentrated in six zip codes

Zip Code	Mean HH Income	Mean Energy Bill	% Energy Burden
30303	\$36,600	\$2,760	7.5%
30310	\$35,103	\$2,161	6.2%
30314	\$33,671	\$1,929	5.7%
30311	\$41,723	\$2,153	5.2%
30315	\$39,115	\$1,850	4.7%
30354	\$39,634	\$1,855	4.7%
30316	\$65,507	\$2,212	3.4%
30331	\$57,360	\$1,890	3.3%
30312	\$53,185	\$1,650	3.1%
30317	\$75,241	\$2,332	3.1%
30318	\$63,356	\$1,930	3.0%
30313	\$59,983	\$1,818	3.0%
30308	\$73,003	\$1,482	2.0%
30305	\$146,565	\$2,951	2.0%
30342	\$128,856	\$2,594	2.0%
30327	\$239,582	\$4,684	2.0%
30324	\$92,423	\$1,735	1.9%
30307	\$124,801	\$2,255	1.8%
30309	\$106,803	\$1,917	1.8%
30306	\$132,706	\$2,276	1.7%
30319	\$133,289	\$2,273	1.7%
30344	\$47,469	\$738	1.6%
30326	\$114,839	\$1,648	1.4%
30363	\$86,429	\$807	0.9%
30336	\$42,751	\$270	0.6%
City	\$82,800	\$2,007	2.9%



A Machine Learning Picture of Energy Footprints in Atlanta



Source: Wenwen Zhang, Caleb Robinson, Subhrajit Guhathakurta, Venu M. Garikapati, Bistra Dilkina, Marilyn A. Brown, and Ram M. Pendyala. 2018. "Estimating Residential Energy Consumption in Metropolitan Areas: A Microsimulation Approach." *Energy*. 155: 162-173, July. <https://authors.elsevier.com/c/1X1Xe1H~c~3jq9>

A Photo Collage of Tier 1 Homes



Next Steps

Discovery (January-May 2018)

- Stakeholder Meetings
- Updated analysis of electricity burden

Assessment (May – August 2018)

- Review of business case/policy drivers
- Low Income Customer Focus Group
- Initial profiles of 6 zip codes

Development (September – December 2018) *Tentative*

- More detailed profiles of 6 zip codes
- Establish principles for future research and/or pilot



Potential Ideas for Phase 3

Expanded Partnerships & New Technologies

Low-Income Households

- Assess connections and gaps for optimizing the available pool of funding between **energy burdened homes “life-cycle” elements** of structural repairs and safety, weatherization and energy efficiency, and water (**could use sample homes from six zip codes to “test”**).
- Motivate innovative technologies for low-cost retrofits and approaches to personal comfort (work with the Georgia Tech Energy Club?)
- Prepare a baseline on education and awareness **of energy efficiency and related resources** among the residents of low-income communities in six targeted zip codes
- Engage new information and communication technology to promote greater awareness (random assignment to experimental & control groups with smart thermostats)
- Learn from evaluation of Southern Company’s Pre-pay program

Core Principle: Awareness needed to link energy use & behavior

Cities Can Make a Difference

The City of Atlanta

- Mandated residential energy benchmarking
- “Model” green lease made available to owners & tenants of MF rental units
- Work with absentee landlords for SF rentals—a neighborhood pilot to promote energy affordability and sustainable development in one or more targeted zip codes
- Building code inspections and home energy ratings required when residential properties are sold
- Develop network of “trusted contractors”—like Solarize Atlanta’s choice of Creative Solar and Hannah Solar

Core Principle: Addressing the landlord/tenant problem

Affordable Energy is a “Material Issue” for Utilities

Utilities

- Quantify arrearages, bad debt, disconnects and health benefits to justify expanding low-income program investments
- On-bill financing for owner-occupied housing
- Energy affordability is a material issue for utilities

Core Principle: Business case for scaling low income programs likely to grow with funding/execution requiring coordinated partnerships.

**Electric Power Research Institute*

***Global Reporting Initiative/Sustainability Accounting Standards Board*

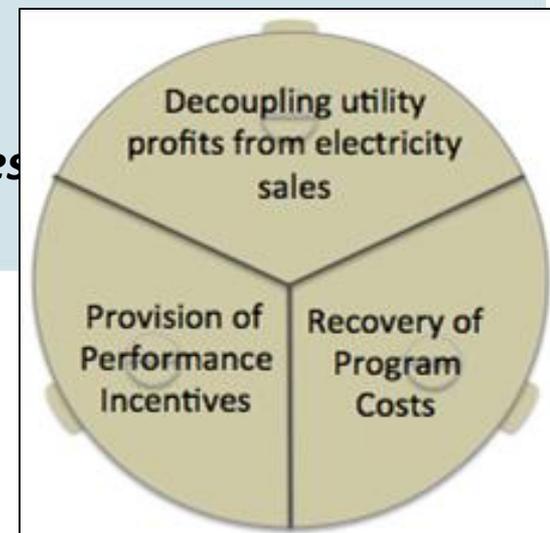
Aligning Incentives

The PSC and other State and Federal Partners

- Regulatory frameworks are needed to incentivize EE (& low income) programs via new/modified cost tests & non-energy benefits (NEBs)
- Rate designs can help or hurt and needs analysis
- Existing programs can be leveraged and coordinated

Core Principle: Energy burden is complex with solutions to root causes necessitating public policy reform + incentives

Source: Brown, Marilyn A., Benjamin Staver, Alexander M. Smith, and John Sibley. 2015. Alternative Business Models for Energy Efficiency: Emerging Trends in the Southeast, *The Electricity Journal*, 2015, 28 (4): 103-117.



The philanthropic community can promote success across all of these solutions.

Thank you.

For More Information — and some late night reading??

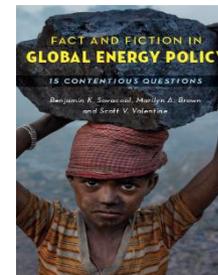
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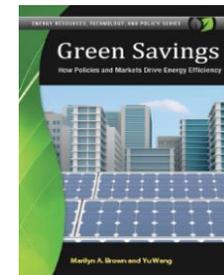
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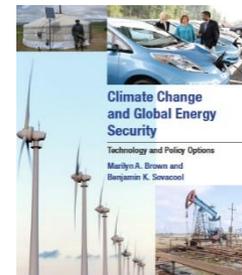
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2016



2015



2013